

Distributed, Passivity-Based, Aeroservoelastic Control (DPASC) of Structurally Efficient Aircraft in the Presence of Gusts, Phase I

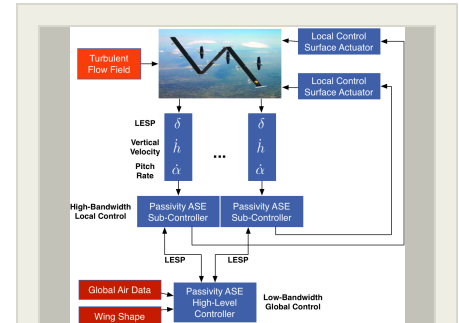
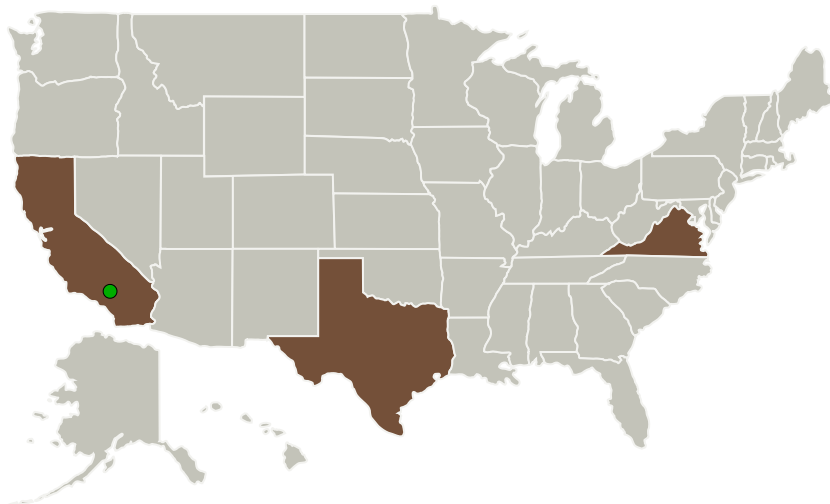
Completed Technology Project (2014 - 2014)



Project Introduction

Control of extremely lightweight, long endurance aircraft poses a challenging aeroservoelastic (ASE) problem due to significantly increased flexibility, and aerodynamic, structural, and actuator nonlinearities. To obtain the benefits of increased aerostructural efficiency, the controller needs to trim at a specified optimal shape while minimizing structural fatigue from gust disturbances. Tao Systems and Texas A&M University propose to develop a distributed, passivity-based, ASE controller (DPASC) using sectional aerodynamic and structural output-only feedback. This scalable, decentralized approach has the potential to minimize the impact of aerodynamic / structural uncertainties and control surface free-play / saturation, while guaranteeing global asymptotic stability.

Primary U.S. Work Locations and Key Partners



Distributed, Passivity-Based, Aeroservoelastic Control (DPASC) of Structurally Efficient Aircraft in the Presence of Gusts Project Image

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Organizations Performing Work	Role	Type	Location
Tao of Systems Integration, Inc.	Lead Organization	Industry Minority-Owned Business, Small Disadvantaged Business (SDB)	Hampton, Virginia
● Armstrong Flight Research Center(AFRC)	Supporting Organization	NASA Center	Edwards, California
Texas A&M Engineering Experiment Station(TEES)	Supporting Organization	Academia	College Station, Texas

Primary U.S. Work Locations

California	Texas
Virginia	

Project Transitions

▶ **June 2014:** Project Start

✓ **December 2014:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/140631>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Tao of Systems Integration, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Arun Mangalam

Co-Investigator:

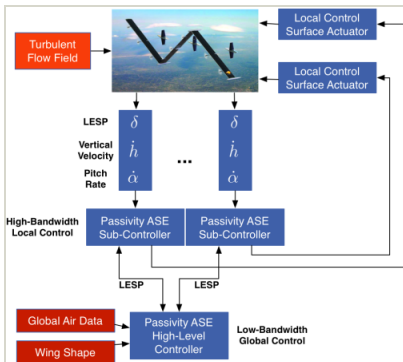
Arun Mangalam

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Images



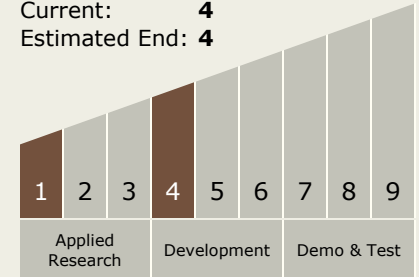
Project Image

Distributed, Passivity-Based, Aeroservoelastic Control (DPASC) of Structurally Efficient Aircraft in the Presence of Gusts Project Image

(<https://techport.nasa.gov/image/130712>)

Technology Maturity (TRL)

Start: **1**
Current: **4**
Estimated End: **4**



Technology Areas

Primary:

- TX04 Robotic Systems
 - TX04.3 Manipulation
 - TX04.3.1 Dexterous Manipulation

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System